AUTOMATIC IDENTIFICATION TECHNOLOGY IN LOGISTICS OPERATIONS

Introduction

Automatic Identification Technology (AIT) includes a variety of read and write data storage technologies that provide an efficient means to capture, store, and retrieve source data with minimum human intervention. Because no single AIT device can satisfy the Army's logistics source data automation, identification, and tracking requirements, the Army embraces a family of AIT devices.

The Army has used AIT since 1981 when the Logistics Application of Automated Marking and Reading

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Symbols (LOGMARS) Program was introduced for bar coding supplies. AIT usage was limited to bar coding technology until the early 1990s.

In every major deployment during the 20th century, DOD has been plagued by the inability to easily identify the contents of shipping containers entering a theater of operations. This was never more evident than in Operations Desert Shield and Desert Storm when thousands of containers had to be opened, inventoried, resealed, and then reinserted into the transportation system. This was necessary because soldiers could not identify their contents. As a result, in FY95, the Total Distribution Program (TDP) Action Plan was developed and approved by the Army Vice Chief of Staff to resolve supply and distribution problems that surfaced during the Gulf War.

The primary focus areas of the TDP include Army total asset visibility (ATAV) and in-transit visibility (ITV). AIT provides source data automation to enhance asset visibility while reducing manual processes and human intervention, thereby increasing data accuracy and validity. AIT augments and interfaces with existing and emerging Automated Information Systems (AISs). ATAV seeks to provide timely supply and transportation information to commanders and materiel managers on Army assets moving through the logistics pipeline. AIT enables ATAV, including intratheater tracking, when properly integrated into AISs associated with the various classes of supply and transportation, and installed at key distribution nodes along the pipeline.

AIT Applications

AIT is used to provide content visibility and nodal tracking of sustainment cargo and cargo in support of deploying/redeploying forces.

A soldier works with the Automated Manifest System, which takes source data from a Standard Army Management Information System and writes to AIT media (2-D bar code, optical memory card, and RF tag).

Army cargo and equipment move from a CONUS industrial and depot base to supply support activities or tactical assembly areas in a theater of operations through various transportation modes and nodes. This is generally known as the logistics pipeline, and it applies to all classes of supplies with some exceptions. Supplies and equipment are also returned to the CONUS depot and industrial base through the reverse pipeline.

The Army uses AIT to track sustainment and retrograde shipments and to assist in the automated process of closing out transportation reports. AIT is also applied to deployment/redeployment operations to provide commanders at all levels with the location and status of deploying units as they move toward their destination. AIT is used to automate the force-closure process. The deploying unit commanders, along with the supporting and supported combatant commanders, have the capability to see closure of the force using the Internet.

AIT can be used for item marking to improve inventory accuracy, control, security, and accountability of small arms and other sensitive items. AIT can also be used to identify, sort, and track regulated hazardous materials; and to automate receipt, inspection, storage, issue, shipment, and inventory control of chemical and biological decontamination and protective equipment and overgarments. Maintainers will likewise benefit from AIT using maintenance business processes that will enable them to accurately document all of their maintenance activities throughout the entire product life cycle, thus facilitating configuration management.

Business Processes

AIT offers operators and supporting AIS program managers an excellent opportunity to re-examine and

An operations noncommissioned officer uses DTRACS to track sensitive cargo and mission convoy movement.

redesign their entire business processes. Efforts should be directed at re-engineering support activities, source data automation, and adoption of proven and successful industry business practices. AIT applications should not be limited to the specific logistics business process being enhanced, but should be applied to the operation as a whole. Business process re-engineering should always be applied rigorously as AIT is being introduced. Recent experiments have shown how the failure to examine related processes can hinder interoperability and efficiency.

AIT Infrastructure

The AIT infrastructure consists of the AIT devices and supporting servers, networks, communication links, databases, and transportation and supply nodes through which supplies, personnel, and units are tracked during movement along the logistics pipeline—from "factory to foxhole," from home base to theater-deployment locations. The AIT infrastructure has evolved to accommo-

date Army and joint business processes. A Radio Frequency Identification (RFID) AIT network has been established to monitor movement of sustainment cargo (air pallets and containers) from distribution depots in CONUS to theaters of operation by military and commercial lines of communication. This infrastructure consists of instrumented defense distribution depots and aerial ports of embarkation and debarkation including commercial ports such as FedEx and Emery.

Selected military and commercial seaports have also been equipped for tracking ocean cargo. Theater and corps-level supply support activities are being equipped to track intra-theater/corps shipments of supplies, repair parts, and components, including retrograde to CONUS. Selected Class I vendor facilities in CONUS have been outfitted to read/write radio frequency (RF) tags for direct vendor delivery of rations from those sites. Information gathered from tagged shipments is reported to ITV servers and relevant AISs and

RF Interrogator and Link (wireless modem) being used at Tuzla Air Base, Bosnia.

In a fully integrated AIT environment, Army maintainers create and use accurate, timely information about the activities they perform and products they maintain. In an automated environment, the latest information is available on demand, and the maintainer easily updates it. The information provides the maintainer specific product repair and performance histories, links to appropriate technical data and troubleshooting guides, and tracks comprehensive configuration information. Other Army materiel managers access the information to support their management activities. Contact memory buttons, bar codes, RF tags and related readers and writers, and servers and communication networks will interface with maintenance automated information systems that support Army maintenance activities worldwide.

Supporting Capabilities

The Army uses various related technologies to augment the Army's AIT infrastructure. Several of these are discussed below.

• A Business Process Server (BPS) is an AIT-enabling technology. A BPS is used when an AIS does not have the ability to interface with AIT devices such as RF tags, optical memory cards, or bar code readers and writers. The BPS acts as an AIT translator by automatically accepting and converting information from AIT sources to the formats required by the supported AIS. The BPS also performs front-end data input and output functions for the AIS.

• ITV servers provide local database storage and transmissions of AIT data to a central database and to other networks. When an RF tag is written, license plate, commodity, and transportation control and movement document (TCMD) data are uploaded to a regional ITV server. Additionally, when an RF tag is read at a node, the tag identification number and the "date-time-group" information are uploaded to a regional

provides content visibility and shipment status.

The deployment infrastructure consists of CONUS power projection platforms and selected power support platforms. These include posts, camps, and stations and their supporting transportation nodes. The Army has installed AIT at selected ports through which designated Active and Reserve deploying units and their required support packages flow from their home stations to their assigned deployment locations in a theater of operations. Tagging vehicles, air pallets, and containers enables commanders to observe and track unit movements throughout the deployment process. Early Entry Deployment Support Kits (EEDSKs) that provide mobile AIT capabilities are placed at selected critical loca-

tions to support power projections where it is not cost-effective or efficient to install a fixed AIT infrastructure.

The ammunition AIT infrastructure consists of ammunition production facilities, depots, ports, and supply points along the logistics pipeline. Ammunition is processed, shipped, and tracked using linear and two-dimensional (2-D) bar codes and RF tags applied at ammunition plants and depots and transported over roads and rails to CONUS ports. The ammunition is then shipped via overseas ports to retail ammunition supply points in a theater of operations. Fixed and hand-held interrogators gather related data and pass it to various nodes along the pipeline and to ITV servers.

ITV server. There is a regional ITV server located at Friedrichsfeld, Germany, and Taegu, Korea. The national ITV server in CONUS collects all AIT data from the regional ITV servers and from CONUS sites and forwards it to the Global Transportation Network (GTN), the ATAV server, and the joint TAV server. The Army Quartermaster School maintains a similarly configured ITV server at Fort Lee, VA, for training purposes.

• Flyaway kits contain RF/AIT equipment configured for mobility, which provides a temporary capability to capture in-transit transportation and asset visibility data at austere locations where elements such as communications and power are not adequate or configured to support AIT operations. The Army has developed one type of flyaway kit, the EEDSK, to provide a mobile AIT capability in support of force projection.

• The Deployment and Sustainment Support Tool (DS2T), formerly known as the Computer Automated Transportation Tool, is a stand-alone tool with the capability to generate standard DOD supply, transportation, and shipping documentation. DS2T is designed to complement existing systems and serve as a bridge for units without an AIS or those awaiting fielding. DS2T is PC-based and provides the capability to read and write linear and 2-D bar codes, RF tags, and optical memory cards. It will also produce a military shipping label, an issue release/receipt document, a TCMD, and a packing list. There are three versions of DS2T: Sustainment, Unit Movement, and Direct Vendor Delivery.

• Satellite tracking systems provide the capability to determine the near real-time location of an asset. These systems are most commonly used to track vehicle location. They usually, but not always, rely on satellite communications. Satellite tracking systems also include two-way communications that allow rerouting of vehicles or whole convoys. The Army uses two satellite tracking sys-tems. The Defense Transportation Tracking System (DTTS) is used to monitor shipments of sensitive conventional arms, ammunition, and explosives, and other sensitive, pilfer-able, hazardous, or high-value material moving from consignor to consignee within CONUS and Canada. This is done by hourly satellite positioning and coded/text messaging from equipped vehicles.

The United States Army, Europe (USAREUR) uses the Defense Transportation Reporting and Control System (DTRACS) to track sensitive cargo and selected convoy movement. Like DTTS, it provides redundant communications capability to units. DTRACS data from Europe updates the GTN via the USAREUR regional ITV server located in Germany. The Army's next evolution of tracking systems has been formalized with the creation of the Movement Tracking System (MTS) Program. MTS provides asset tracking and an added capability for the assistant driver to visualize, on a small color map, the position of his/her vehicle and other vehicles from the same unit.

Another form of satellite tracking called the Mobile Positioning Initiative is being demonstrated in USAREUR. This initiative combines several technologies to provide better asset visibility, command and control, and also convoy or single truck and trailer tracking. This new initiative has provided USAREUR the capability to look at the possibility to shrink the fixed RFID-fixed infrastructure, and to provide near real-time asset tracking of vehicles or trailers and the cargo that is on them.

Summary

The Department of the Army is committed to transforming its logistics business process through innovation and exploitation of technology. A key enabler of Army logistics transformation is AIT. Information gathered and processed through the use of AIT will span the entire product life cycle, from initial manufacturing through usage, and from maintenance cycles to reutilization or destruction. Effectively applied to Army logistics and sustainment operations, AIT can support a number of broad Army goals, including improving logistics productivity, reducing the battlefield logistics footprint, reducing total ownership costs, and increasing operational readiness.

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